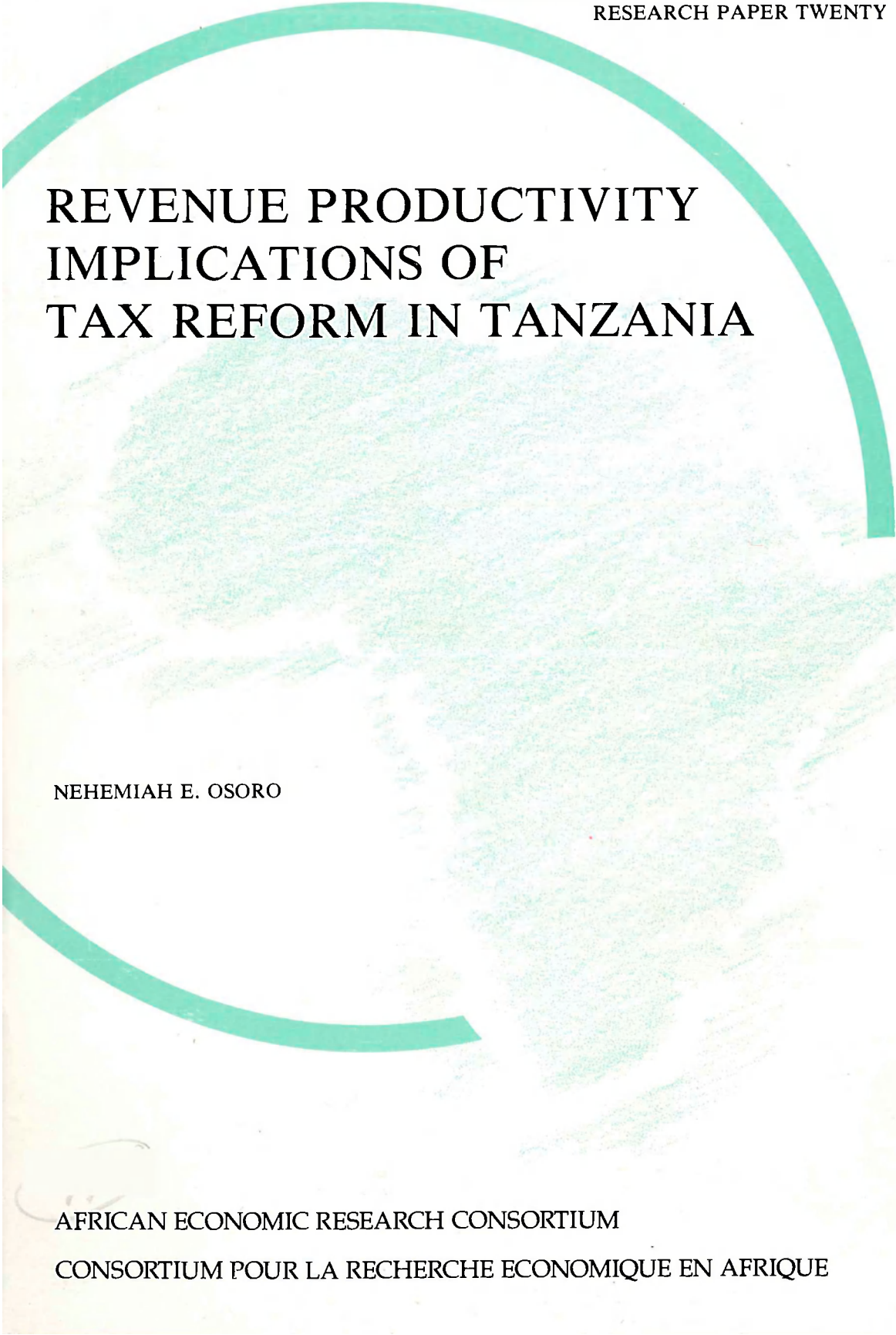


SEPTEMBER 1993

RESEARCH PAPER TWENTY



# REVENUE PRODUCTIVITY IMPLICATIONS OF TAX REFORM IN TANZANIA

NEHEMIAH E. OSORO

AFRICAN ECONOMIC RESEARCH CONSORTIUM

CONSORTIUM POUR LA RECHERCHE ECONOMIQUE EN AFRIQUE

**Revenue productivity  
implications of  
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# **Revenue productivity implications of tax reform in Tanzania**

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**AERC Research Paper 20**  
**African Economic Research Consortium, Nairobi**  
**September 1993**

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Published by Centre for the Study of African Economies,  
University of Oxford,  
St Cross Building, Manor Road,  
Oxford, OX1 3UL,  
England.

for the African Economic Research Consortium,  
P.O. Box 62882, Nairobi, Kenya.

Printed by Zakuna Printers Ltd.  
P.O. Box 45804,  
Nairobi, Kenya.

**British Library Cataloguing-in-Publication Data.**  
**A catalogue record for this book is available from the British Library.**

ISBN 1-897621-14-0

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## **I Introduction**

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Tax reform is a change in the status quo. It has been one of the major preoccupations of most developing countries in the 1980s. Over 100 attempts at tax reforms in developing countries have been recorded since 1945. Tax reform has turned from a desired or preferred task to being a necessary one (Gillis, 1989a). One of the victims of numerous economic crises that have plagued developing countries since the first oil shock in 1973 has been the tax system. Consequently, tax collections have been hit hard resulting in large fiscal deficits. Unfortunately, in the 1980s external finances with which to finance fiscal deficits were not forthcoming, developing countries were left with no option but to print more money to finance deficits, with consequent double-digit inflation.

Most developing countries suffer from over-dependence on a small number of sources of tax revenue which are vulnerable to external events, which remains a crucial problem in their tax system. These sources include import and export taxes on mineral products, the prices of which are determined on world markets, and tend to be volatile. These taxes constitute a major source of revenue in many developing countries.

The above problems have created the need for many developing countries to undertake tax reforms during the 1980s. Most of these reforms, however, have been on tax structure, with the general objectives of revenue adequacy, economic efficiency, equity and fairness, and simplicity. It is pertinent to point out that even if the reform is compatible with the macroeconomic objectives of the government, there is little chance of success if it either cannot be administered, or administrative reforms cannot be undertaken. Many tax reforms carried out in developing countries have been on tax structure rather than on tax administration.

Over the last 28 years of independence, the tax system in Tanzania has undergone fundamental reform in response to the need for economic and social development. While a series of basic tax reforms have been undertaken, particularly since the fiscal year 1969/70, the central government has failed massively to generate sufficient tax revenue to meet the current needs for government services. The tax burden, measured by the ratio of tax to GDP, has

averaged around 21.6% over the 1979/89 period (Appendix Table 1). The tax ratio has exhibited a zero trend over the 1979/84 period. However, the period after 1984 registered an increasing trend, suggesting that reforms have increased the tax burden over the period. Although Tanzania's tax to GDP ratio is higher than that of Eastern Asian countries, it is far below that of OECD countries<sup>1</sup> (Appendix Tables 2 and 3).

This apparent failure of the tax system to generate sufficient revenue has led to the government running increasingly huge deficits in both the current and overall government budget, particularly since the fiscal year 1978/9. Consequently, bank borrowing and external finance were sought as temporary measures to finance the deficits. Since these two sources of deficit financing are not suitable in the medium and long terms, efforts must be made to design a tax system that is viable and able to support government services without recourse to printing money and seeking external funds.

The purpose of this study is to examine the revenue productivity implications of tax reform in Tanzania, focusing it as a way of raising the productivity of the tax system. Specific objectives are: (1) to analyze the productivity performance of the tax system and individual major taxes, which will entail the analysis of tax elasticity at two levels, base-to-income elasticity and tax-to-base elasticity; and (2) to link the tax exemption analysis with the discussion and empirical estimation of tax elasticities. In particular, the objective is to assess the impact of exemptions on elasticities.

Section II summarizes the theoretical discussion on tax reform. Section III provides an overview of tax reform. Section IV discusses the revenue productivity of Tanzanian taxes and the overall tax system. The section provides a definition of buoyancy and elasticity, a discussion of techniques of measuring elasticity and buoyancy, and a survey of empirical results. Section V links tax exemption analysis to an empirical estimation of tax elasticities. Section VI provides the conclusions.

## **II Conceptual framework**

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### **Recent theory and issues in tax reform**

The literature on tax reform has been growing rapidly, suggesting the theoretical and practical importance of the subject. Much of the literature has been more descriptive than analytical. The techniques applied to evaluating success or failure of tax reforms are not well documented. Normally the analysis of tax reform has tended to focus on evaluating the objectives of those reforms: revenue adequacy, economic efficiency, equity, and simplicity. The need for tax reform arises from the deficiency of the existing tax system in achieving these objectives (McMahon and Berrios, 1991, p.5).

Revenue adequacy is the basic elementary standard that a tax system ought to achieve. The existing budget deficits in many developing countries suggest that the tax systems are not revenue productive. Some may overlook this and attribute the cause of deficits to excessive spending, or temporarily adverse economic conditions. In situations where budget deficits persist for a long period, one has to ask whether increased revenue should not be the main objective of tax reform. The answer is bound to depend on the circumstances of each country. Certainly, few, if any, developing countries can afford to adopt tax reforms, no matter how desirable they might be on other grounds, if they lead to substantial revenue losses. Goode (1987) argues that it is hard to gain serious consideration for any revenue-neutral reform proposal. By and large, in Africa most finance ministers consider revenue gain as the primary motive for tax reform.

Optimal tax theory still has a significant influence on academic research in tax reform. This approach is used by Newberry and Stern (1987) who apply a normative framework to analyze the tax reform process. The optimal taxation approach emphasizes the need to analyze the impact of tax reform and evaluate both its administrative costs and its effect on social welfare. This framework has been criticized for its inability to identify the real practical needs of tax reform in developing countries. Its first major shortcoming is that it requires substantial data which are scarce or non-existent in many developing countries. Second, optimal taxation has assumed the existence of perfect administration. However, the recent reform experiences have revealed a serious lack of

administration capacity in virtually all developing countries, showing the need for simpler administrative structures. The impact of optimal taxation on tax reform in developing countries has been small and indirect (Gillis, 1989b, p. 515) because of this deficiency. In addition, under the optimal taxation approach the analysis of revenue productivity of a tax would be of less significance.

### Trends in tax reform in the 1980s

As already pointed out, the 1980s was an important period for tax reforms worldwide, from which clear patterns are observable. Significant elements of these trends have included the introduction of a uniform rate value-added tax system (VAT) as a standard model of commodity taxation, a change in the direction of broader personal and corporate income tax bases; more emphasis on improving tax administration, and more indication of the income tax system. As regards income taxation, the inclination has been to broaden the tax base to reduce the tax rates, both of which bring about important effects on the efficiency of the system and on vertical equity. Buchanan (1987) argues that for some taxpayers the rate reductions do not fully offset the greater revenue raised by broadening the tax base. Despite the reduction in their excess burden, they will suffer net utility losses.

Income taxation, as the main instrument to achieve the goal of vertical equity, seems to have been declining in importance. The combination of base-broadening and higher tax revenues from tax reform appears to be far more effective tools for meeting equity goals. Base-broadening clearly contributes to redistribution because income excluded from taxation is largely received by high-income families. The role of high tax revenues in income redistribution deserves special comment. Studies of the impact of the budget on income distribution, in the US, Columbia, Malaysia and Chile, strongly indicate that if the budget is to serve redistributive purposes effectively, the primary emphasis must be placed upon the expenditure, not the tax, side of the budget.<sup>2</sup> In brief, the incidence studies suggest that the expenditure side of the Indonesian budget has been a much more effective means of shifting income and services to the poor than the tax side (Gillis, 1985, p. 235).

In the area of commodity taxation, there has been a trend to replace the turnover sales taxes by value-added taxes. In Musgrave's opinion, these trends have certain implications: a change in the perception of income tax as the main instrument of progressive taxation; an increasing acceptance of consumption as the tax base; and the emergence of VAT as the appropriate means for income tax reform (Khalilzadeh-Shirazi and Shah, 1990, Ch. 18, pp. 4-5).

These changes in approach followed an academic preference for consumption as the tax base. Musgrave argues that important factors in promoting this process were the complexities of direct taxation, distortions introduced by incentive effects, and the shifting political attitude towards equity (McMahon and Berrios, 1991, p.7).

### Reform of tax administration

A single obvious conclusion which the recent tax reform has demonstrated has been the need for a simple and manageable tax system. Ironically, justice has not been done to tax administration in the literature on the subject (McMahon and Berrios, 1991, p. 7).

The 1980s have shown the importance of the administrative limits of tax systems in developing countries. A sharp contrast can be seen between the real conditions for implementing tax systems and the degree of complexity with which the structures have been designed. Advisers of the administration should stress the need for clear and simple tax structures and real administrative capacity to implement them.

Bird (1990, pp. 1-20) identifies three different approaches to reforms of tax structures and tax administration: first, the reform of tax structures, followed by administrative changes; second, administrative changes followed by reform of the tax structure; and the third approach considers administrative changes and reform of tax structures as being independent. The third approach is the commonly accepted view at present.

### **III Overview of tax reform in Tanzania**

---

#### **Introduction**

Tax reform raises four basic questions: why do it? when should it be done? in what direction should it go? how should it be implemented? The brief discussion of tax reform in Tanzania presented below is carried out in the context of these questions. Tanzania has undertaken important reforms in its tax system over the past three decades. The objectives of these reforms have largely been base-broadening, rate-increasing, rate-reducing, introducing new taxes, abolishing certain taxes, simplifying the tax system and providing fiscal incentives.

#### **Tax reform in the 1960s**

The 1960s, characterized by the absence of economic hardships and crises, experienced very few tax reforms, the only one undertaken being the introduction of the Sales Tax Act of 1969. This was introduced partly to offset the decline in import duty revenues caused by the growth of import substitution industries, and partly due to reduced rural taxation (Budget Speech, 1969/70, pp. 21-22). Above all, the basic objective of the reform was revenue.

#### **Tax reform in the 1970s**

The economic atmosphere changed in the 1970s. The 1973/74 period saw the first oil price shock, followed by the extensive drought of 1974/75, both of which had a great impact on the production of food and traditional exports. Added to these catastrophes was the war with Uganda in 1978/79 which took a indeterminable financial and social toll, officially estimated at US\$500 million. The situation was further aggravated by the intensification of the Southern Africa struggle, the second oil price shock wave of 1978, coupled

with a deterioration in agricultural export performance in the wake of drought and floods during the latter part of 1979. Over the entire decade, the only good years were 1976 and 1977 when the country enjoyed the coffee boom. Since 1978, the country has been running huge deficits on both current and overall government budgets.

Tax reform in the 1970s aimed mainly at revenue generation to meet the rapid increase in government current expenditures. To achieve this major objective, tax reform focused on base-broadening and rate-increasing. Another reform objective was equity. Other non-revenue objectives of tax reform like efficiency, simplicity, and promotion of domestic investment or production, received very little attention from the reform package.

The 1970s reform gave birth to the Income Tax Act of 1973. Prior to 1973, income tax in East Africa was administered by the East African Income Tax Department. Negotiations had been going on during 1971-72 between Kenya, Uganda, and Tanzania and the Eastern African Community on how to improve income tax collection in a manner equitable to the three countries. Subsequently, it was considered appropriate to place the responsibility of income tax in the hands of each national government. This was based on two factors. First, the partner states had been pursuing diverse policies since independence, and second, there were management problems in collecting income tax (Budget Speech, 1973/74).

In response, income tax in Tanzania was reorganized under the Income Tax Act 1973, which was one of the country's major tax reforms. The major objectives of the Act were: (1) to amalgamate the old personal income tax and surtaxes into a single individual income tax; (2) to abolish the single, married and child allowances; (3) to make income tax more progressive; (4) to reduce income inequality; and (5) to generate revenue to finance the rapidly expanding expenditure level. Nevertheless, the thrust of the reform was on objectives (3), (4) and (5) (Osoro, 1985). Once again, the simplicity objective did not feature at all.

The 1973 Act made tax rates more progressive than the previous ones (Budget Speech, 1973/74). The marginal rates ranged from 20 to 95%. Married and child allowances were eliminated on the ground that these allowances had previously applied only to high-income earners who constituted a minor portion of the total labour force in the economy. Ironically, similar allowances were re-introduced in 1978, though with minor modifications.<sup>3</sup> The married and child allowances were re-introduced as a government response to the arguments which ensued in the National Assembly in 1978 which claimed that married taxpayers bringing up children bore a heavier responsibility than those without families (Budget Speech, 1978/79). Were such considerations not important when similar allowances were abolished in 1973?



Other major tax reforms undertaken in the 1970s were in the area of excise duty and sales tax. In 1976 the 1969 Sales Tax Act was repealed and replaced by the 1976 Sales Tax Act.<sup>4</sup> The new Act provided for base-broadening and rate-increasing to generate more revenue. It has been argued in some official reports that the reform made sales tax less progressive. Excise duty on beer and cigarettes was abolished in the fiscal year 1978/79, and finally abolished on all previously excisable goods in the fiscal year 1979/80. The outcome of this measure was a substantial rise in sales tax rates to offset the resulting revenue loss and a further complication of the sales tax structure.

The final major tax reform was the raising of company tax rates from 45 to 50% and from 50 to 55% for resident and non-resident companies respectively in 1976. Like other tax reforms in the 1970s, the objective was revenue generation.

To reiterate, the motive behind tax reform in the 1970s was to enhance revenue generation and to introduce the consideration of equity. However, the reform generated complexities in the tax system in both the rate structure of import duties and sales tax at the end of the decade.

### Tax reform in the 1980s

The early years of the 1980s, like the mid-1970s, were characterized by drought. The country recorded huge deficits in the fiscal budget and in the balance-of-payments account. Foreign funds needed to reduce these deficits were not forthcoming. The crisis intensified when government attempts to negotiate with the IMF failed. Thus, the Government had no option but to rely on domestic resources: the major domestic source of deficit financing was through the government borrowing and running the printing press. In the case of the balance-of-payments deficits, trade restrictions and exchange control measures were enforced by the government to limit imports of foreign goods.

The tax reforms before 1985 aimed at raising rates of import duties and sales tax with a view to raising revenue: import duty rates were as high as 1,100%.

These reforms led to complicated tax structures. In 1969, there were no more than five *ad valorem* and half-a-dozen specific rates of sales tax, but by the early 1980s the rates had increased to over 25 of each, some of which were most odd and inconvenient.

From 1984 onwards the country's policies changed direction. In 1984 trade liberalization was introduced. Negotiations with the IMF were concluded in 1986 paving the way for an inflow of foreign resources into the country. The Economic Recovery Programme (ERP) was launched in the same year. These

developments generated a new look at tax policy. Several studies on the tax system were undertaken by the World Bank, the IMF, and local tax experts for the government. Most of these studies recommended, among other things, the simplification and rationalization of the major taxes through the reduction of rates and rate categories with a view to improving compliance and tax administration. These studies were, however, undertaken at the behest of the World Bank and the IMF.

In 1985 all export taxes were abolished, in order to reduce the tax burden and give incentives to exporters. In addition, the measure was expected to enable the country to sell its exports at competitive prices (Budget Speech, 1985/86). In the same year, the Sales Tax Act was amended and the Registered Dealers Certificate (RDC) was introduced, p. 30). A road toll was also introduced in 1985. From 1985, import duty and sales tax rates were gradually reduced each year. Nevertheless, a more significant rate reduction and rationalization occurred in 1988 and 1990 with respect to import duty and sales tax, respectively. Excise duty was re-introduced in 1989 to facilitate rationalization and simplification of sales tax structure and administration.

In the area of income taxation, marginal tax rates were reduced from a range of 20-95% to 15-75% in 1986/87, to a range of 15-55% in 1986, further to a range of 10-50% in 1989, and finally to a range of 7.5-40% in 1990. These rate reductions were aimed at enhancing the take-home pay of a worker whose real income had been declining throughout the decade.

## Summary

It should now be evident that tax reform in Tanzania during the past three decades has largely focused on increasing revenue rather than improving efficiency. The target of simplifying the system was set during the second half of the 1980s; recognition of the importance of reforming the administration has emerged recently. In Tanzania, tax reform has been used as an instrument of raising revenue productivity. This is the thrust of the analysis of the rest of this paper. The next section analyses the revenue productivity of the tax system.

## IV Revenue productivity of the Tanzanian tax system

---

### Definition of elasticity of buoyancy

One criterion of a good tax system is high revenue productivity (Asher, 1989b, p. 12). The common measures of such productivity are buoyancy and elasticity.

Two factors can give rise to growth in tax revenues: (1) the rules or rates of tax can be changed to raise more revenue from the same base: or (2) the base on which the tax is imposed may grow. The growth of tax in response to GDP can therefore be broken down into two components: the *automatic* growth as the base on which the tax is charged grows in relation to GDP, and the growth resulting from *discretionary* changes in tax rates and rules. The combined effect is known as the *buoyancy* of a tax. A buoyancy coefficient of 1.6 would imply that for every 1% increase in GDP, revenue from the tax had, on average, grown by 1.6%. The effect of automatic growth alone, abstracting from discretionary changes, is known as the elasticity of tax. Accordingly, an elasticity coefficient of 1.6 would imply that for every 1% increase in GDP, revenue from the tax *would* have grown by 1.6% if the rules and rates of the tax had remained unchanged.

It is, by and large, desirable that the revenue growth of a tax keeps pace with that of GDP without frequent discretionary changes having to be made to its rates and structure. This requires that the tax elasticity coefficient be equal to, or exceed, one.

It is conventional to give the elasticity of a tax revenue in relation to income in aggregate models as a single number, but it is seen more appropriately as the weighted average of the elasticities of separate taxes which usually differ widely in response to changes in income. Thus, overall tax elasticities should be measured by analysing the elasticities of individual taxes separately. For analytical purposes it is important to break down the income elasticity of each separate tax into two elements: the elasticity of the tax to the base, and the elasticity of the base to income. In symbols, these elasticities are defined (Mansfield, 1972, pp.426-7) as follows:

a) Elasticity of total tax revenue to income,

$$E_{T_i} = \frac{\Delta T_i}{\Delta Y} \times \frac{Y}{T_i}$$

b) Elasticity of  $k$ th individual tax to income,

$$E_{T_k} = \frac{\Delta T_k}{\Delta Y} \times \frac{Y}{T_k}$$

c) Elasticity of  $k$ th individual tax to base,

$$E_{T_k B_k} = \frac{\Delta T_k}{\Delta B_k} \times \frac{B_k}{T_k}$$

d) Elasticity of  $k$ th individual base to income,

$$E_{B_k} = \frac{\Delta B_k}{\Delta Y} \times \frac{Y}{B_k}$$

Where  $T_i$  is total tax revenue,  $T_k$  is tax revenue from  $k$ th tax,  $Y$  is income measured by gross domestic product (GDP),  $B_k$  is the base of  $k$ th tax, and  $\Delta$  is the discrete change in the variable associated with it.

Given these definitions of elasticity, it follows that in a system of  $n$  taxes:

$$(1) \quad E_{T_i} = \frac{T_1}{T_i} \left( \frac{\Delta T_1}{\Delta Y} \cdot \frac{Y}{T_1} \right) + \dots + \frac{T_k}{T_i} \left( \frac{\Delta T_k}{\Delta Y} \cdot \frac{Y}{T_k} \right) + \dots + \frac{T_n}{T_i} \left( \frac{\Delta T_n}{\Delta Y} \cdot \frac{Y}{T_n} \right)$$

Expression (1) states that the elasticity of total tax revenue to income is equal to the weighted sum of the individual tax elasticities (where the weights are the fractional distribution to total tax by each individual tax). In addition, as stated in expression (2), the elasticity of any separate tax may be broken down into the product of elasticity of the tax to its base and the elasticity of base to income.

$$(2) \quad E_{T_n} (\Delta T_k / \Delta B_k \times B_k / T_k) (\Delta B_k / \Delta Y \cdot Y / B_k)$$

Finally, using (1) and (2), elasticity of total tax revenue to income in a system of  $n$  taxes depends on the product of the elasticity of tax-to-base and base-to-income elasticity for each separate tax, weighted by the importance of that tax in the total system.

$$(3) \quad E_{T_y} = T_1/T_y [(\Delta T_1/\Delta B_1 \cdot B_1/T_1) (\Delta B_1/\Delta Y \cdot Y/B_1)] + \dots \\ + \dots T_k/T_y [(\Delta T_k/\Delta B_k \cdot B_k/T_k) (\Delta B_k/\Delta Y \cdot Y/B_k)] \\ + \dots T_n/T_y [(\Delta T_n/\Delta B_n \cdot B_n/T_n) (\Delta B_n/\Delta Y \cdot Y/B_n)]$$

This analysis of the income elasticity of the tax system has two advantages. First, it permits identification of the sources of fast revenue growth and, conversely, the sources of lagging revenue growth. For example, a high value elasticity (greater than unity) would reflect fast revenue growth, while a low value (less than unity) would imply lagging revenue growth. Second, equation (3) allows identification of that part of growth which policy makers can control (Mansfield, p. 427).

### Techniques for estimating tax elasticities

Tax buoyancy measures the responsiveness of tax revenue to changes in income or output with no attempt to control for discretionary changes in tax policy. The traditional way to estimate the elasticity of a particular tax,  $k$ , is with the following model:

$$(4) \quad T_k = \alpha_k Y^{\beta_k} e_k$$

Logarithmic transformation gives

$$(5) \quad \ln T_k = \ln \alpha_k + \beta_k \ln Y + u_k$$

Where  $T$  is tax revenue,  $Y$  is GDP, and  $u$  is a stochastic disturbance term. Ordinary least square is used to estimate the coefficients  $\alpha$  and  $\beta$ . Since the

equation is in double log form, it provides an estimate of tax buoyancy because it measures the percentage response in the left-hand side variable.

Income elasticity is, however, rather difficult to measure, as it requires an estimate of what would have happened if changes to the tax structure had not been made. Thus, estimating tax elasticity involves modifying the above model to account for discretionary changes in tax policy. A variety of factors can cause tax revenue to change: discretionary changes in tax base and rates; the efficiency of tax administration; introduction of new taxes, and abolition of other taxes, etc. In order to estimate income elasticity, historical tax revenue series ought to be adjusted to eliminate the effects on tax revenue of all factors other than GDP.

One technique for cleansing the revenue series of discretionary effects is that of proportional adjustment. This technique identifies a revenue yield based on rates and exemptions in one reference year, taken in this study as the first year, as part of an annual adjustment over a longer period. A sequence of multiplicative factors is used to measure the revenue impact of discretionary changes in each year, and adjustments are then made according to the impact of those changes. Thus, if actual collections in year  $t$  are 1,000, but discretionary changes in year  $t$  account for 150 of that 1,000, so that at tax rate of year  $t_1$ , revenue would have been 850, revenues in year  $t$  are multiplied by  $850/1000$ , scaling down by 15% to what they would have been without the discretionary changes of year  $t$ . A series of revenue based on the tax structure of the first year can be derived using a series of multiplicative factors.<sup>5</sup> The formula is as follows:

$$(6) \quad T_{1,j} = T_{j-1,j} \cdot \frac{T_{j-1,j-1}}{T_{j-1}} \cdots \frac{T_{2,3}}{T_3} \cdot \frac{T_{1,2}}{T_2}$$

where

$T_j$  denotes the actual yield in the  $j$ th year

$T_{1,j}$  denotes the collection of the  $j$ th year adjusted to the structure of the  $i$ th year chosen as the reference or base year, and

$T_{j-1,j} = T_j - D_j$  where  $D_j$  is the revenue effect (positive or negative) in the  $j$ th year of the discretionary change in that year.

The resulting series reflects only automatic changes in revenue resulting from the evolution of the size and distribution of the tax base, that is, what collections would have been if the 1979 structure had been in force throughout the sample period.

The estimates of the revenue impact of discretionary changes are derived largely from the publication of annual budget speeches. All the information available has been used in these estimates, there is, however, no means of checking on their accuracy (Byrne, 1983, p.135). Appendix Table 4 shows the revenue estimates of the impact of discretionary tax changes.

Once the data have been subjected to the above method, the model (5) is estimated on the adjusted data:

$$(7) \quad \log AT_k = \log \alpha_k + \beta_k \log Y + u_k$$

and  $\alpha_k$  provides an estimate of the elasticity of the  $k$ th tax.

A second method for estimating tax elasticity is the dummy variable technique developed by Singer (1968). This involves introducing a dummy variable into model (5) for each exogenous tax policy change. The revised model takes the form

$$(8) \quad \log T_k = \log \gamma_{0k} + \gamma_{1k} \log Y + \sum \gamma_{2i} D_i + e_k$$

where the dummy variable  $D$  takes on the value 0 before the discretionary change, and 1 after the change. The summation accounts for the possibility of multiple changes during the period. In this model the coefficient  $\gamma_{1k}$  estimates the elasticity. In spite of the simplicity of this technique, its use in estimating elasticity becomes very limited when the number of discretionary changes is large relative to length of data period.

A series of discretionary changes has taken place in Tanzania during the sample period (1979-89). This limits the use of the dummy variable technique in this study. For this reason, the proportional adjustment method was used to estimate elasticities of taxes (see Table 1).

**Table 1** Tanzania: elasticity of major taxes and of the total tax system, 1969-90

	Elasticity coefficient	Weight of tax in 1989 (in per cent of total)	$\bar{R}^2$	T-test	D.W.
1. Income tax	0.7589*	27.4089	0.9778	16.4764	1.8720 <sup>a</sup>
Company tax <sup>b</sup>	1.1349*	22.7680	0.9762	6.9175	1.4481 <sup>a</sup>
PAYE <sup>b</sup>	0.6601*	2.8337	0.9808	26.7683	1.8136
2. Sales tax	0.7943*	31.6548	0.9800	16.0078	1.9105 <sup>a</sup>
3. Import duty	0.5518*	14.6460	0.5518	2.8641	2.2936 <sup>a</sup>
4. Total of (1) - (3)		73.7097			
5. Total tax system	0.7588*	100.0000	0.9778	16.4764	1.8720 <sup>a</sup>

Notes: \* Coefficient significant at the 1% level.

a Indicates use of the Cochrane-Orcutt process of adjustment for auto-correlation.

b Estimation based on 1976-90 data since disaggregated data on company tax and PAYE were not available for the years before 1976.



## Proxy bases

As discussed in the introduction, this paper considers the decomposition of income elasticity into tax-to-base elasticity and base-to-income elasticity. The proxy base taken for income taxes was non-agricultural GDP, and for company tax it was corporate profits. These profits are from parastatals and therefore exclude private corporations. The proxy base for PAYE (pay as you earn) was the wage bill.

Since the type of sales tax levied in Tanzania was a manufacturing-level sales tax, manufacturing output was taken as a proxy base for the tax. Private final consumption would have been used as a proxy base if sales tax was levied at both wholesale and retail levels. Finally, the proxy base taken for import duties was imports (c.i.f.).

## Data

The data on tax revenues were obtained from *Financial Statement and Revenue Estimates* published by the Treasury. Estimates of discretionary tax changes were obtained from *Budget Speeches*, also a Treasury publication. Data on the wage bill and manufacturing output were from the *Economic Survey*, published by the Planning Commission. Corporate profits figures were from *Parastatals Accounts*, published by the Central Statistical Bureau. GDP figures were obtained from the *National Accounts for Tanzania* also published by the Central Statistical Bureau, and import figures were from *Economic and Operation Report* published by the Bank of Tanzania.

## Elasticity of the tax system

Elasticities of the total tax system and of major taxes are presented in Table 2. The elasticity of the total system was 0.76 over the 1969-90 period. Elasticities of individual taxes were rather divergent: the elasticity of sales tax, the bulwark of the system, was 0.79; income taxes had an elasticity of 0.91; company tax and PAYE had elasticities of 1.13 and 0.66 respectively; and import duty had an elasticity of 0.55.

Before analysing individual elasticities in detail certain points should be noted.

1. The overall elasticity of the tax system of 0.76 suggests that discretionary changes undertaken during the 1969-90 period failed to raise the ratio of tax to GDP.
2. Sales tax, Tanzania's main source of revenue, had an elasticity below unity, owing possibly to generous exemptions and apparent tax evasion. Weak tax administration has also been a factor in contributing to a low elasticity coefficient of sales tax.
3. Elasticity of income taxes was below unity. However, company tax exhibited an elasticity greater than unity and higher than that of income tax, while PAYE showed a much lower elasticity.
4. Interpretation of the statistics  $\bar{R}^2$  for the total tax system and for individual taxes is important, since this statistic measures the extent to which changes in tax revenue are systematically correlated with changes in GDP. For total taxes, the level of  $\bar{R}^2$  is 0.98, indicating that the correlation is quite high. This finding is of some interest, as many aggregate economic models assume that tax revenues are functionally related to GDP (Mansfield, 1972, p. 435). The high level of  $\bar{R}^2$  for total taxes in Tanzania would tend to bear out this assumption on purely *statistical*, as opposed to *causative* grounds. For all but import duty, the  $\bar{R}^2$  is around 0.98, suggesting a good fit for the estimated equations.
5. Where the Durbin-Watson statistic indicated the presence of auto-correlated disturbances, the iterative Cochrane-Orcutt process was used.<sup>6</sup> This process results in an estimate with a smaller sampling variance than does the ordinary least-squares method, and also results in consistent estimation of the error variance.

### Decomposition of elasticities

It has been demonstrated that the elasticity of a given tax consists of two elements: the elasticity relative to the base (tax-to-base elasticity); and the elasticity of the base to income (base-to-income elasticity). Thus the income elasticity of a given tax is a product of tax-to-base and base-to-income elasticities.

Since the legal base of each tax is not available, the yields of the five major types of taxes in Tanzania accounting for close to three-quarters of total tax revenue has been related to GDP. These relationships are summarized in Table 2 and are discussed below.

**Table 2** Tanzania: decomposition of tax elasticities, 1979-89

Tax and related proxy base	Tax-to-income elasticity			Proxy base-to-income elasticity			Tax-to-proxy base elasticity		
	Coefficient	$\bar{R}^2$	D.W.	Coefficient	$\bar{R}^2$	D.W.	Coefficient	$\bar{R}^2$	D.W.
Income taxes and non-agricultural GDP	0.9158*	0.9812	2.0604 <sup>a</sup>	0.8698*	0.9986	1.6722 <sup>a</sup>	1.0743*	0.9877	2.0967 <sup>a</sup>
Company tax and corporate profits <sup>b</sup>	1.1349*	0.9790	1.4481 <sup>a</sup>	1.1170*	0.9085	1.9167 <sup>a</sup>	0.9006*	0.9012	2.0979
PAYE and wage bill <sup>b</sup>	0.6601*	0.9821	1.8136	0.4231*	0.9043	1.8921 <sup>a</sup>	1.5062*	0.9469	1.8333
Sales tax and manufacturing output	0.7943	0.9800	1.9105 <sup>a</sup>	0.7083	0.9860	1.9935 <sup>a</sup>	1.0171*	0.9724	1.5759 <sup>a</sup>
Import duty and imports (c.i.f.)	0.5518*	0.5036	2.2936 <sup>a</sup>	1.5923*	0.9704	1.5425 <sup>a</sup>	0.4367*	0.5469	1.6941

Notes: \* Coefficient significant at the 1% level.

a Indicates use of the Cochrane-Orcutt process of adjustment for auto-correlation.

b Estimation based on 1976-90 data since disaggregated data on company tax and PAYE were not available for the years before 1976.

### *Sales tax*

Sales tax brings in the bulk of sales tax revenue. It is levied on locally manufactured goods, imports and a few services: electricity, telephone and hotel services. However, the 1976 Sales Tax Act allows for exemption on all types of goods. It is interesting to note that the low elasticity of 0.79 for sales tax is a product of a relatively low base-to-income elasticity (0.71) and a relatively high tax-to-base elasticity (1.02). The former suggests that over the 1969-90 period there has been slow growth in the sales tax base relative to growth in GDP. At the same time, tax collections have slightly accelerated in proportion to the growth of the tax base (manufacturing output). The low coefficient of tax-to-base elasticity (of around unity) probably reflects the combined effect of granting exemptions and inefficient tax administration. Nevertheless, the relative importance of these elements in depressing the coefficient would be difficult to ascertain. The  $\bar{R}^2$  statistic is relatively high for all three coefficients, suggesting that the function assumed is a good fit for the data.

### *Import duties*

In theory, import charges are levied on all imports. In practice, however, exemptions for some capital goods, raw materials, and even consumer goods are generally granted by the import duty legislation. The elasticity of this tax was less than unity (0.55). Base-to-income elasticity (1.59) was higher than tax-to-base elasticity (0.43). The low tax-to-base elasticity seems to have been attributable to exemptions, tax evasion and poor overall tax administration. In contrast, the high base-to-income elasticity apparently reflects rapid growth in imports, in particular during the second half of the 1980s arising from trade liberalization initiated in 1984. The  $\bar{R}^2$  statistic indicates a low relationship between tax collections and income. Nevertheless, the  $\bar{R}^2$  is high for base-to-income elasticity equation.

### *Company tax*

Company tax is the next most important to income tax, contributing over two-thirds of income tax revenue. According to the company tax legislation, the tax is levied on corporate profits, private and public. In 1989, parastatals accounted for 65.2% of total company taxes. Private corporate profits were excluded from the base for two reasons: access to them is difficult to obtain

and even if they are found, they may not be reliable. The elasticity of this tax was 1.13. The relatively low tax-to-base elasticity of 0.90 reflects weak tax administration and the existence of tax evasion. The relatively high base-to-income elasticity of greater than unity suggests that corporate profits have been growing faster than GDP. The  $\bar{R}^2$  statistic is relatively high for all three equations, indicating that the function assumed is a good fit for the data.

### *PAYE*

PAYE (pay as you earn) shows an interesting pattern in that the wage bill grew much less slowly than income (with a base-to-income elasticity of 0.42), but the tax-to-base elasticity was considerably higher (1.51). The income elasticity of less than unity (0.66) is a product of a high tax-to-base elasticity and a low base-to-income elasticity. The low base-to-income elasticity reflects slow growth in the wage bill in relation to GDP; the level of pay has been far below the living wage since the beginning of the last decade. A high tax-to-base elasticity might be explained by the imposition of very high marginal rates, and the fact that PAYE is the tax with possibly the highest compliance since it is deducted at source. Nevertheless, this high coefficient is offset by a considerably lower base-to-income elasticity coefficient, the product of which is an income elasticity of 0.66. The  $\bar{R}^2$  statistic is high for all three equations.

### *Income taxes*

The income elasticity of income taxes was less than unity. This is a product of low base-to-income elasticity (0.87) and tax-to-base elasticity of around unity. Thus, a relatively low base-to-income elasticity suggests that monetary GDP has grown less in proportion to GDP. The marginally elastic tax-to-base elasticity reflects net ineffective tax collection arising from weak tax administration. The  $\bar{R}^2$  statistics are quite high for all coefficients suggesting a good fit for the data.

### *Summary of decomposition analysis*

Analysis of the components of the overall tax elasticities emphasizes the generally low value of the base-to-income relative to tax-to-base elasticities as key factors in explaining the fairly low elasticity of the tax system. If the

collection of income tax, sales tax and PAYE had grown relative to their respective bases, overall elasticities would have been much higher. Tax-to-base elasticities can be improved through better tax administration (in the narrow sense of more efficient procedures), minimization of tax evasion, reduction or abolition of exemptions, and use of *ad valorem* rates to increase revenue as the value of the base rises. The tax-to-base constituent of elasticity is, therefore, partly within the control of the authorities.

In contrast, the enhancement of the base-to-income elasticity, that is the growth of the tax base, lies outside the control of the authorities (apart from the influence of tax policy itself). In general, growth in the tax base is mainly determined by the way the structure of the economy changes with economic growth. In designing income-elastic taxes, both the predicted response of that tax base to income, and the potential for an effective and/or improved level of administration, should be considered (Mansfield, 1972, p.427).

### Tax buoyancy versus tax elasticity

As in the case of elasticity, the buoyancy coefficient has been estimated from a double log function implying the original form

$$T = \alpha Y^\beta e_k$$

The difference between tax-to-income elasticity and tax buoyancy shows the importance of discretionary changes, while a tax-by-tax comparison of the two measures points to the taxes for which discretionary changes are most important.

As shown in Table 3, the tax system as a whole had a buoyancy of 1.06 against elasticity of 0.76. The major cause of growth of total tax revenue can be seen to lie in discretionary changes, particularly the increase in tax rates over the period.

Income taxes, like total taxes, exhibited a buoyancy coefficient exceeding the elasticity coefficient. This suggests that discretionary changes were responsible for the growth of income tax revenue over the period. The buoyancy and elasticity coefficients relating to company tax were the same. This was because company tax rates had remained the same over the period, in the same way, the difference between buoyancy and elasticity relating to PAYE was zero. There were changes in PAYE marginal rates in 1986 and 1989. However, they

were mainly aimed at raising the take-home pay of the worker, as opposed to increasing tax collections.

For sales tax, buoyancy was larger than elasticity, which again suggested that discretionary changes were responsible for the growth in yield (over the period examined). In contrast, import duty, the least elastic tax, exhibited the greatest difference between buoyancy and elasticity. The major cause for the growth of import duty revenues lies in discretionary changes, particularly the increases in tax rates over the period, and the rationalization of import duty rates, and rate categories.

**Table 3** Tanzania: difference between tax buoyancy and elasticity for total tax and selected major taxes, 1969-90

	Buoyancy	Elasticity	Difference (in percentage points)
Total taxes	1.0602	0.7588	0.3014
Income taxes	0.0397	0.9158	0.1239
Company taxes	1.1349	1.1349	0.0000
PAYE	0.6601	0.6601	0.0000
Sales tax	0.8961	0.7943	0.1018
Import duty	1.0843	0.5518	0.5325

## **V Tax exemptions and elasticities**

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### **Exemptions**

One major weakness of the Tanzanian tax system is that it allows for numerous and generous exemptions. Most of these exemptions apply to indirect taxes (excise duties, import duties and sales tax). Nevertheless, exemptions also extend to direct taxes.

Zero-rating is one form of exemption in Tanzania. In the case of sales tax it applies to basic foods: it aims to improve the distribution of tax and help to minimize the cascading in the processed food industry. Apart from food, zero rating applies to certain industrial inputs and machinery, yet it does not cover others, like industrial chemicals, office equipment and supplies. The major flaw of this approach is that some goods, which were exempted because they are productive inputs, can also be legally used for other purposes, but still evade tax. Thus, there is a consequent loss of revenue while the benefits of such exemptions spill over to unintended beneficiaries.

According to Section 7 of the 1976 Customs Tariff Act, the Minister of Finance has discretionary powers to exempt goods and individuals from full or partial payment of duty. Further, his discretionary power also extends to modifying Parts A and B of the Third Schedule. For all practical purposes, the Minister has discretionary power over all exemptions.

Part A of the Third Schedule to the 1976 Customs Tariff Act lists 17 bodies entitled to exemption from duty, such as government, diplomatic, international and religious bodies. Part B lists 24 general exemptions including aircraft operations, passengers' luggage, containers, printed matter, industrial sewing machines, ship accessories, educational articles and materials.

The discretionary exemptions under Section 7 are not listed, but the discretionary power is conferred on the Minister of Finance. The coverage is not explicit, but seems to include exemptions on a case-by-case basis: partial exemptions are granted according to the Minister's assessment of desirability, to parastatal institutions and manufacturers. Between 1981 and 1988 the Minister allowed duty to be paid by instalment, but this was without legal authority, the Sales Tax Act did not permit payment in this way. The position was legalised in July 1988. By 1990, out of a total postponement of Tsh 49.5 million in duty since 1981, only Tsh 7.9 million (or 16%) of the total has been



paid. At present not less than 82 importers enjoy some postponement of duty payment.

Table 4 shows taxes paid and exemptions granted on imports cleared through customs. In 1989 exempted imports were about 58% of fully taxed imports and about 37% of total imports. Taxes forgone through exemptions registered Tsh 23,572.3 or 16.9%, 26.7% and 46.2% of total imports, fully taxed imports and exempted imports, respectively. Of exempted taxes, parastatal exemptions constituted 34.1%, government exemptions 19.7%, religious organisations/bodies 10.6%, private exemptions 8.2%, and the rest 27.4%. Further, import duties and sales tax accounted for 48.8%, respectively.

Total taxes paid constituted 20.1% of fully taxed imports, 16.9% of exempted imports, and 13.5% of total imports. On the basis of granting exemptions on imports, in 1989 the effective rate of taxes on imports was only 13.5%. This is rather low when compared with the maximum import duty rate of 60%, and maximum sales tax rate of 50% which were applicable in 1989. The large number of exemptions have had a marked affect on tax collections.

## Exemptions and elasticities

The discussion of exemptions is important since they have a significant impact on the effective tax base. The provision of generous exemptions often tends to erode the tax base which, in turn, affects income elasticity of a tax through tax-to-base elasticity. In the previous section, sales tax was found to have a low elasticity of 0.73. This was argued to be a product of a high base-to-income elasticity of 1.26 and a low tax-to-base elasticity of 0.53. This implies that the base of sales tax grew faster than that of GDP, while tax collections grew much more slowly than the base, possibly due to exemptions granted. Thus these exemptions seem to have been responsible for offsetting the fast growth of the sales tax base (over the 1979-89 period), thereby depressing the income elasticity of the tax.

Import duties also exhibited an elasticity less than unity (0.80). Such a low elasticity was a product of a high base-to-income and low tax-to-base elasticity. Exemptions seem to have lowered the income elasticity of import duties through depressing tax-to-base elasticity.

In the case of income taxes, figures on exemptions are not available because the 1973 Income Tax Act does not legally require the exempted taxpayer to file a return: the Income Tax Department has no knowledge of the amounts of tax forgone through exemption. In view of this, it is impossible to relate elasticities of income taxes to exemptions in the absence of relevant data.

**Table 4** Tanzania: taxes paid and exemptions granted on goods cleared through customs, 1989 (in millions Tsh)

	Fully taxed imports	Exempted imports	Total imports
Value	88,247.9	50,970.3	139,245.2
Taxes paid	17,769.8	958.6	18,728.4
Import duty	10,224.7	781.8	11,006.5
Sales tax	7,110.4	173.8	7,284.2
Excise duty	434.7	3.0	437.7
Taxes exempted		23,572.3	23,572.3
Import duty		11,410.2	11,410.2
Sales tax	-	11,515.6	11,515.6
Excise duty	646.5	646.5	
Taxes paid plus exemptions granted	17,769.8	24,530.9	42,300.7
Exemptions as percentage of value *	26.7	46.2	16.9
Exemptions as percentage of potential taxes *	100.0	96.1	55.7
Taxes paid as percentage of taxes exempted *	-	4.1	79.5
Taxes paid as percentage of value*	20.1	1.9	13.5

Note: \* Percentages computed by author.  
Source: Customs and Sales Tax Department.

## **VI Conclusion**

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In recent years tax reform has turned from a desired or preferred task to being a necessary one. The poor performance of revenue sources in generating adequate revenues has created the need for tax reforms in many developing countries. Since the end of the 1960s, the tax system of Tanzania has undergone fundamental reforms. In general, these have largely aimed at raising revenue to match rapidly growing fiscal spending. Tax reform has been used as an instrument of raising the revenue productivity of the tax system.

Estimates of income elasticities of individual taxes and total taxes, based on empirical evidence, suggests that tax reform has, nevertheless, failed to raise the revenue productivity. This is reflected in elasticities less than unity for the major taxes and total tax system. However, all taxes (including the total tax system), except company tax and PAYE, had a buoyancy coefficient greater than elasticity coefficient, indicating that discretionary changes were important in raising tax revenues. Discretionary changes were most needed in the collection of import duties, income taxes, and sales tax, in that order.

The failure of tax reform to improve the revenue productivity of the tax system seems to have been caused by granting generous exemptions and poor tax administration. Exemptions have particularly reduced the effective base of income taxes, PAYE, and sales tax.

The empirical results in this study have important implications for tax reform. An elastic tax structure is appropriate in a developing economy because it implies that tax collections will grow automatically with growing income without the need to resort to any politically sensitive increase in tax rates (Due, 1981, p. 550). Since elasticity is an important element of taxation in a developing economy, the authorities must be able to identify those taxes which are elastic and those which are not. To raise the overall elasticity of the tax system requires focusing on those taxes which are most income elastic.

For income taxes, PAYE and sales tax, for which tax-to-base elasticity coefficients are lower than base-to-income elasticity coefficients, the income elasticities of the respective taxes and the overall tax system would have been much higher had their respective bases grown at least at the same rate or higher than growth of GDP. This paper has argued above that the generally low tax-to-base elasticities seem to have been a result of poor tax administration combined with the existence of generous exemptions.

Accordingly, the authorities should direct tax reform towards improving administration and reducing, or totally eliminating, tax exemptions, which often erode the effective tax base.

In the case of those taxes with a base-to-income elasticity coefficient lower than unity (income taxes, sales tax and PAYE), there is very little leeway for the authorities to improve these coefficients since the growth of the tax base is outside their control. Nevertheless, the only option the government may utilize to broaden the tax base is to reduce or eliminate tax exemptions on income taxes and sales tax. Finally, should the authorities in Tanzania wish to design income-elastic taxes, apart from improving the level of administration and reducing or eliminating exemptions, the predicted response of tax base to income must be seriously considered.

## Appendix

**Appendix Table 1** Tanzania: central government tax revenues (as percentage of GDP)

1979	21.1	1985	18.5
1980	21.7	1986	20.9
1981	21.0	1987	22.0
1982	21.2	1988	23.8
1983	21.8	1989	23.3
1984	22.2		

Source: Computed using data obtained from *Financial Statements and Revenue Estimates*, Vol. 1, various years, *National Accounts of Tanzania* (1976-89) and *Hali ya Uchumi wa Taifa* (1982) and (1990) issues.

**Appendix Table 2** Central governments of ASEAN: tax revenues (as percentage of GDP)

	A	T
Indonesia	20.58	16.4
Malaysia	22.70	17.8
Philippines	11.02	13.3
Singapore	19.60	13.1
Thailand	13.60	15.2

Notes: A Average of 1981 to 1985

T Terminal year. 1987 for the Philippines, Singapore and Thailand; and 1988 for Indonesia and Malaysia.

Source: Asher, Mukul G. (ed.), 1989, in *Fiscal Systems and Practices in ASEAN: Trends, Impact and Evaluation*, Singapore, Institute of Southern Asian Studies, Table 1.1, p. 5.

**Appendix Table 3** Tax revenues as percentage of GDP, 1985\*

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Sweden	50.5
Denmark	48.5
France	45.6
Netherlands	44.9
United Kingdom	38.1
Germany	37.1
Italy	34.7
Canada	33.2
Australia	30.4
United States	29.2
Japan	28.0

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Notes: \* Includes national and local taxes  
Source: World Tax Reform: a Progress Report.

**Appendix Table 4** Tanzania: revenue effects of discretionary tax changes, 1979-89 (in millions of shillings)

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
<b>Income tax</b>											
Amendment of income legislation					500						
Introduction of pay roll levy							198				
Strengthening of tax administration and collection										3400	
<b>Sales tax</b>											
Increase in rates	174	490	282		655	797	587	2093	251	806	587
Revision of taxable of sugar						100					
Broadening tax base									60	25	
Strengthening tax administration and collection										1383	
Rationalization of tax administration and simplification of rates		430									
<b>Import duty</b>											
Increase in rates	35		345		80		10	255	47		
Removal of exemptions	177										
Strengthening tax administration and collection										517	
Rationalization of customs tariff structure (base and rate)		-350									

continued ...

**Appendix Table 4 cont ...**

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
<b>Stamp duty</b>											
Increase in rates	15				500						
Abolition of stamp duty		-30					198				
Strengthening of tax administration and collection										450	
<b>Others*</b>											
Increase in rates	374	-10	10			34	7	30	137	45	603
Introduction of new taxes (road toll, foreign travel levy, and cassette rental tax)	20						67			15	
Reintroduction of previously abolished taxes (road licence and excise duty)	20										1649
Broadening tax base (increase in toll stations)							30	5	156	545	

Note:\* Others include export tax, motor vehicle taxes and licences, foreign travel levy, airport departure tax, video cassette rental tax, land rent tax, hotel levy and business licences.

Source: Budget Speech for fiscal years 1979/80-1989/90.

## Notes

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1. The relatively high tax to GDP ratio should be interpreted with caution since in Tanzania GDP figures are likely to be under-estimated. The possible under-estimation arises because the underground economy, which is argued to be quite significant, is not taken into account.
2. For the US see Musgrave and Musgrave (1984, Ch. 12). For evidence on the relative roles of the tax and expenditure sides of the budget in income redistribution in LDCs, see (for Chile) Foxley, Aminat and Arrallaw (1979, Ch. 6) for Colombia, Selowsky (1979, Ch.1) and for Malaysia, Snodgrass, 1974.
3. The married allowance for a spouse was Tsh 60, and child allowance was Tsh 10 per child, applicable up to four children. Thus a married person with four children received a total married and child allowance of Tsh 100. This amount of money is meaningless today. At the current exchange rate, it is equivalent to US\$0.43.
4. For a detailed discussion see the 1976 Sales Tax Act.
5. This method was first used by Prest, 1962. A formally comparable method was used by Sahota, 1961.
6. See Johnston, 1984, and Cochrane and Orcutt, 1949.

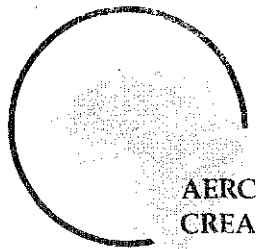


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